

TWIN CITY LINES

FALL 2013



From 1902 until 1911, the Incline ran with a single small car on the west track and a counterweight on the east track. The three intermediate stations were simple open platforms placed over the east track. By 1910 it was experiencing severe overloads every rush hour, and Duluth Street Railway decided an upgrade was needed. In this photo, the car and counterweight meet at the 4th Street station. Detroit Publishing Company photo, Library of Congress collection.



TWIN CITY LINES

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The Minnesota Streetcar Museum operates the Como-Harriet Streetcar Line in Minneapolis and the Excelsior Streetcar Line in Excelsior. Its mission is to preserve Minnesota's electric railway heritage.

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Corrections and New Info

The photo on page 5 of the last issue shows a streetcar pulling a former cable car trailer, not a former horsecar.

The designed-but-never-built express boat Tonka would have been powered by a diesel engine, not a gasoline engine. It's worth noting that it had a much shallower draft than the steam powered express boats, 3 feet 3 inches instead of 5 feet.

The photo on page 18 was taken before the Split Rock lighthouse tramway was built. It shows only the stairway that preceded the tramway, which was built next to it.

An issue of Twin City Lines requires a large number of facts and not surprisingly, your editor gets some of them wrong or misses the whole story. After each issue, Russ Olson sends me an email with the correct information, and usually adds pertinent facts. I'm grateful to him for this, so here are his comments on the last issue.

"Page 3: Selby Avenue cable train photo. The 1887-1888 built grip cars for Selby Avenue had deck roofs while the 1889-1890 grip cars for E. 7th Street and Selby Avenue had 'railroad roofs' with rounded ends as shown in the photo. The trailers built in 1887-mid 1888 had deck roofs; trailers built in late 1889 thru 1890 had railroad roofs.

Page 4: I don't think it was possible for the early electric cars to travel 30 mph or more. My estimate would be 15-20 mph because the single truck cars only had 15 hp motors and the double truck cars 25 hp motors. Even later cars with 40 hp motors were geared for 26 mph.

Page 5: Open cars modified by cutting an aisle down the middle of the seats. This was not done. Minneapolis cars 201-262 had the bench seats changed to longitudinal (center facing).

All the other open cars were built with a center aisle.

Pages 6 and 7: Of the 50 double truck open cars delivered in 1892-1893, 36 were new and 14 were rebuilt Motor Line trailers.

Page 7: Of the 16-foot former horsecars that were lengthened, Jones Sons built 38 for Minneapolis, but the 30 for St. Paul were built by Stephenson and Brownell.

Page 9: Photo of car 777. Both the upper and lower sash on these cars could be lowered into the sidewalk.

Page 10: The adoption of air brakes began before 1905. The seven Stillwater cars and Lowry's private car got them in 1899. 900-949 were the first order of new cars to get them in 1902. All the older double truck cars were equipped with air brakes in 1902-1903.

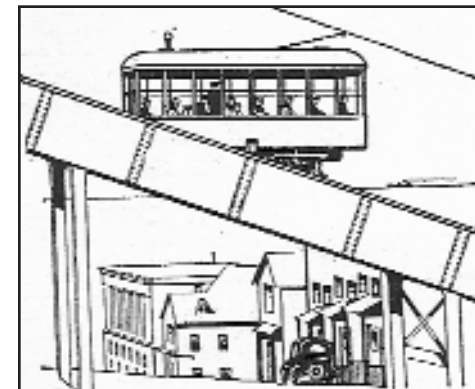
Page 11: Lake Minnetonka interurban. There is speculation that this car was intended for the Twin City & Lake Superior, which tried to build a high speed electric line to Duluth.

Page 15: Double deck cars. 1092 was built in 1904 for sightseeing and charter service, a year before the Lake Minnetonka line opened. The side screens and canvas roof canopy were added in 1905.

As actually built, car 1145's upper deck did not extend over the rear platform.

Car 1160 could not have used the upper deck from 1092 without modifications because it was longer and wider than 1092.

Page 16: Proposed one-man car. One of the notes on that drawing suggests removal of the rear platform to reduce weight. Another drawing done in 1931 and titled 'Experimental One-man Car Remodeled 1290 Type' is of a standard car with the rear platform removed. Interesting that TCRT kept this approach in mind for another 12 years."



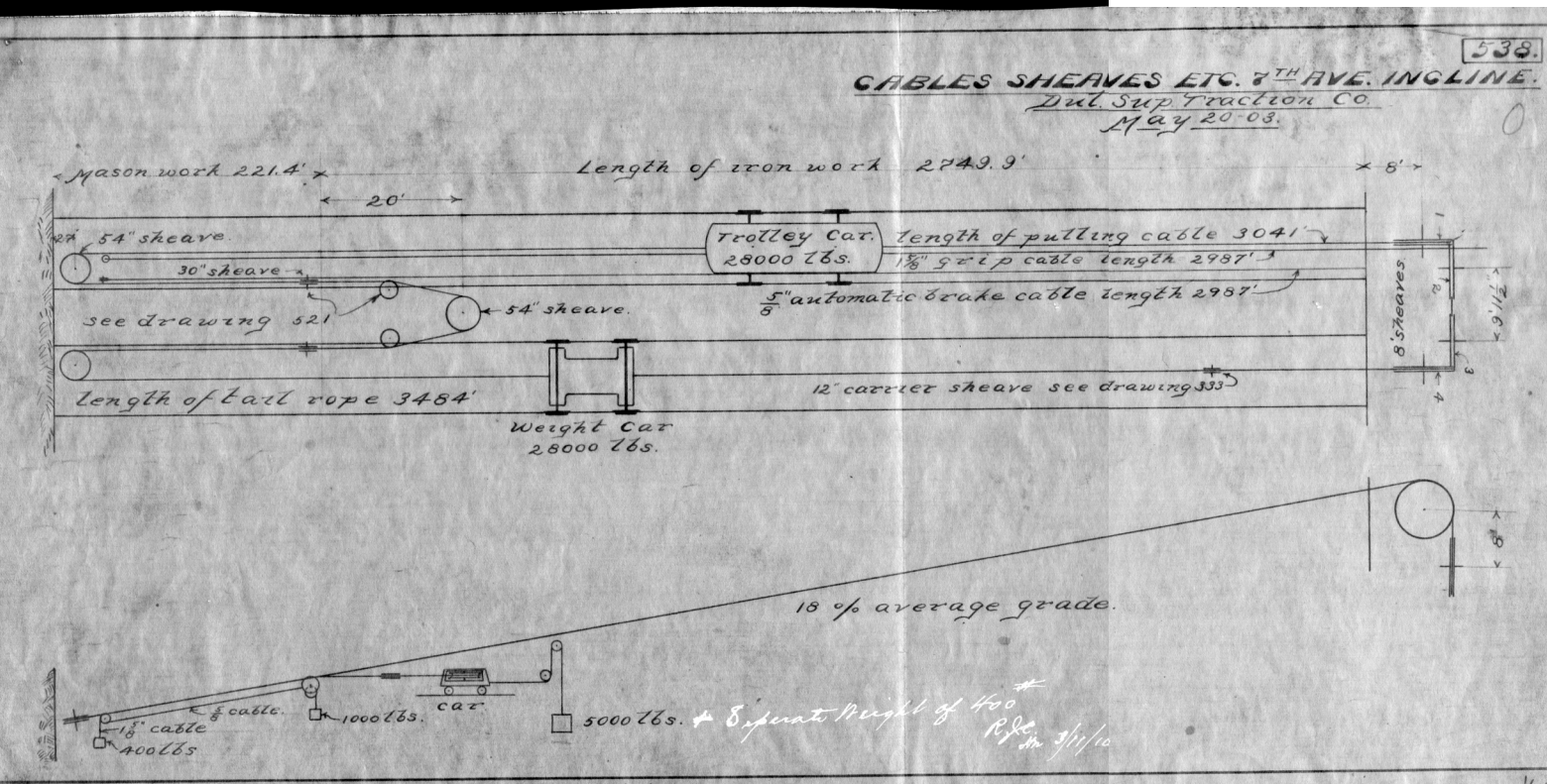
Rebuilding the Incline

-Aaron Isaacs

In the Jim Kreuzberger collection of materials on the Duluth Street Railway is a large chron file that details how the 7th Avenue West Incline was rebuilt in 1910-11. The rebuild more than doubled its capacity, with a pair of larger cars replacing a single car that had been paired with a counterweight. The project was designed by Walter J. Smith, TCRT's Master Mechanic. He was well acquainted with the Incline. As DSR's Master Mechanic in 1901, he rebuilt the Incline following the disastrous fire that destroyed its powerhouse and one of its two cars.

Russ Olson in *Electric Railways of Minnesota* notes that TCRT and DSR collaborated on the design of the cars and the hoisting equipment. The correspondence reveals that TCRT in fact manufactured everything new that was needed and also installed it. This includes the two cars, the hoisting equipment, the new intermediate stations and the top and base stations, as well as new electrification and a telephone system. All the fabrication was done at Snelling Shops and the components were shipped to Duluth.

Front cover: Thanks to the preserved files of the Duluth Street Railway, this issue tells the detailed story of how the 7th Avenue West Incline in Duluth was rebuilt in 1910-1911. You'll also learn about the connecting but isolated Highland streetcar line and the Incline in its earlier days.



Left and right: These schematic drawings show the Incline and its hoisting mechanism before and after rebuilding in 1911.

Below: Duluth Street Railway General Manager Herbert Warren.



DSR employees supplied the manual labor and did needed track maintenance during the construction shutdown, but TCRT acted, in the words of one memo, like "an outside contractor".

For an historian, having a complete file of project correspondence in chronological order is almost too good to be true. The letters and memos reveal how the project developed and how it changed as new problems arose and were solved. The file starts with this concise summary in a memo from TCRT Master Mechanic Walter Smith to DSR General Manager Herbert Warren.

March 14, 1910

I hand you herewith preliminary plan of the two new cars, waiting stations, depots and engineer's house, for the incline equipment.

In explanation of this plan, would say that in place of the present car and counter

weight we propose putting on two new cars. These cars would be much wider than the present car; being 10'-6" wide by 22' long, affording a fine view of the lake and harbor from the lake side. These cars will be without motors and will be provided with elliptical springs and rubber cushions over the journal boxes so that they are practically noiseless when in operation. Cars will be provided with hand wheel brakes, air operated wheel brakes, air operated grip brake and automatic grip brake. These in addition to the appliances which the engineer at the head of the incline will have for stopping the cars.

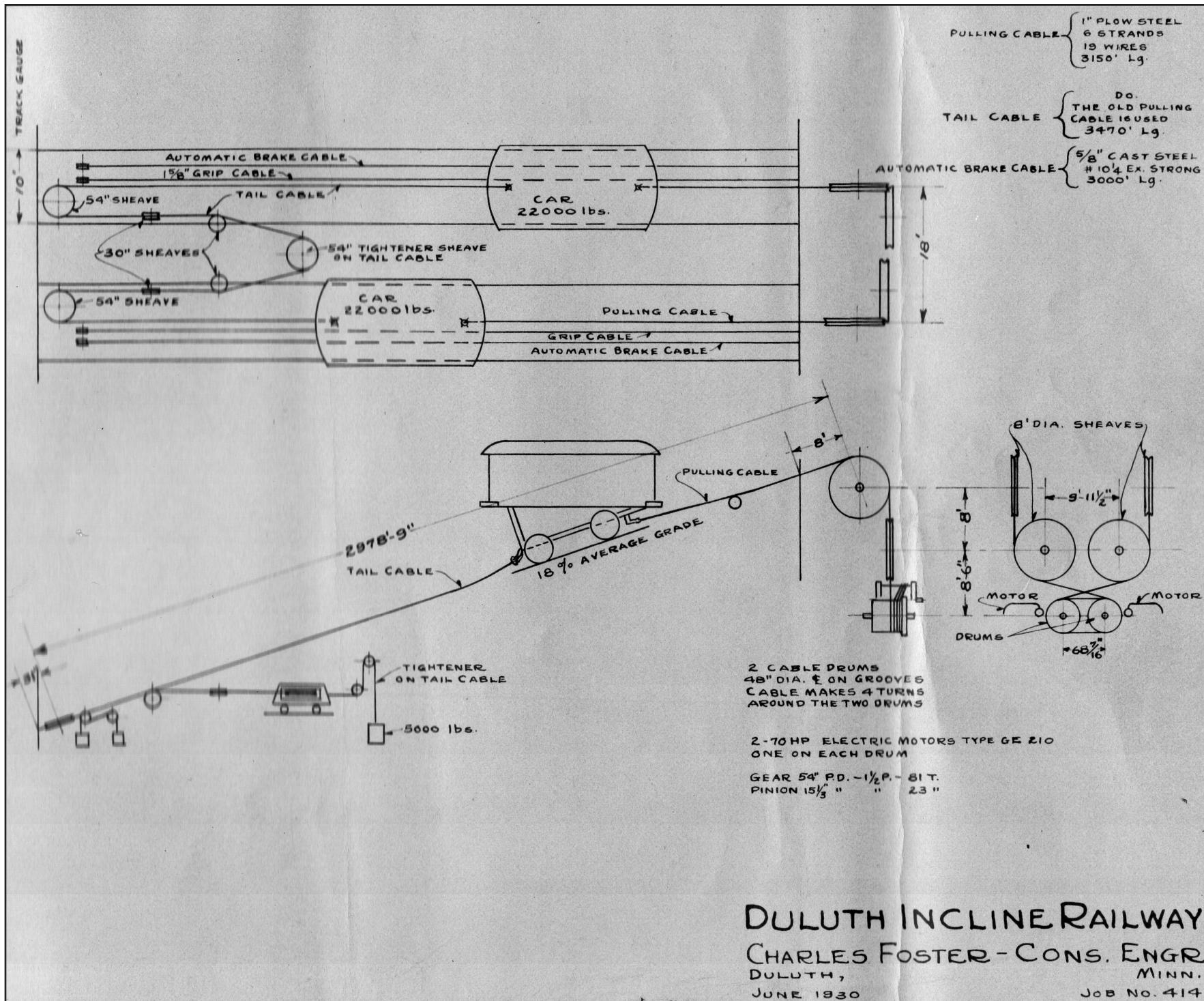
The cable arrangement will be practically the same as under the present system. The motive power will consist of an electrical hoisting engine provided with two motors of large capacity. This machinery will be located at the head of the incline and will be enclosed in a suitable house. Machinery will be operated by an engineer, who will have perfect control of

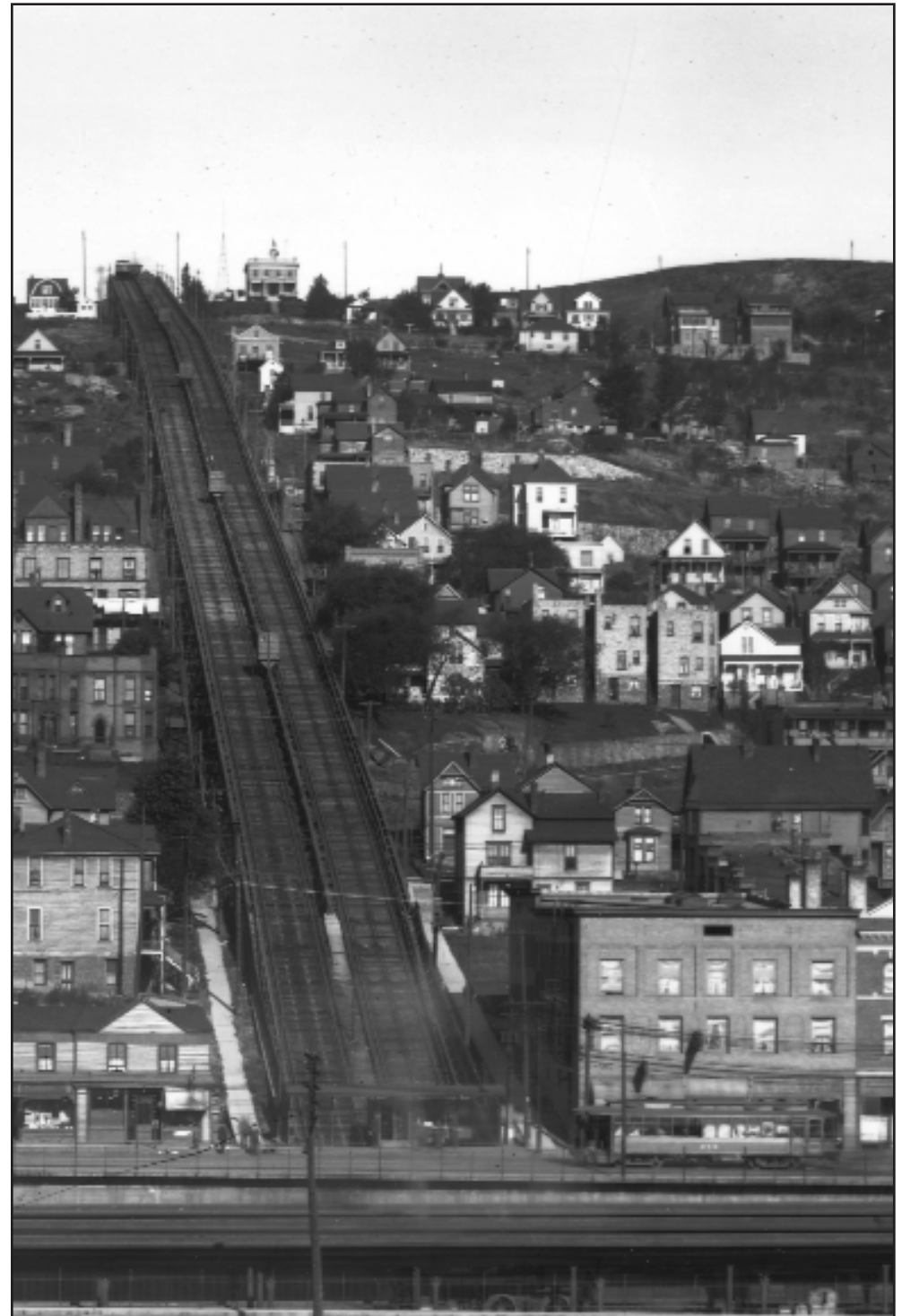
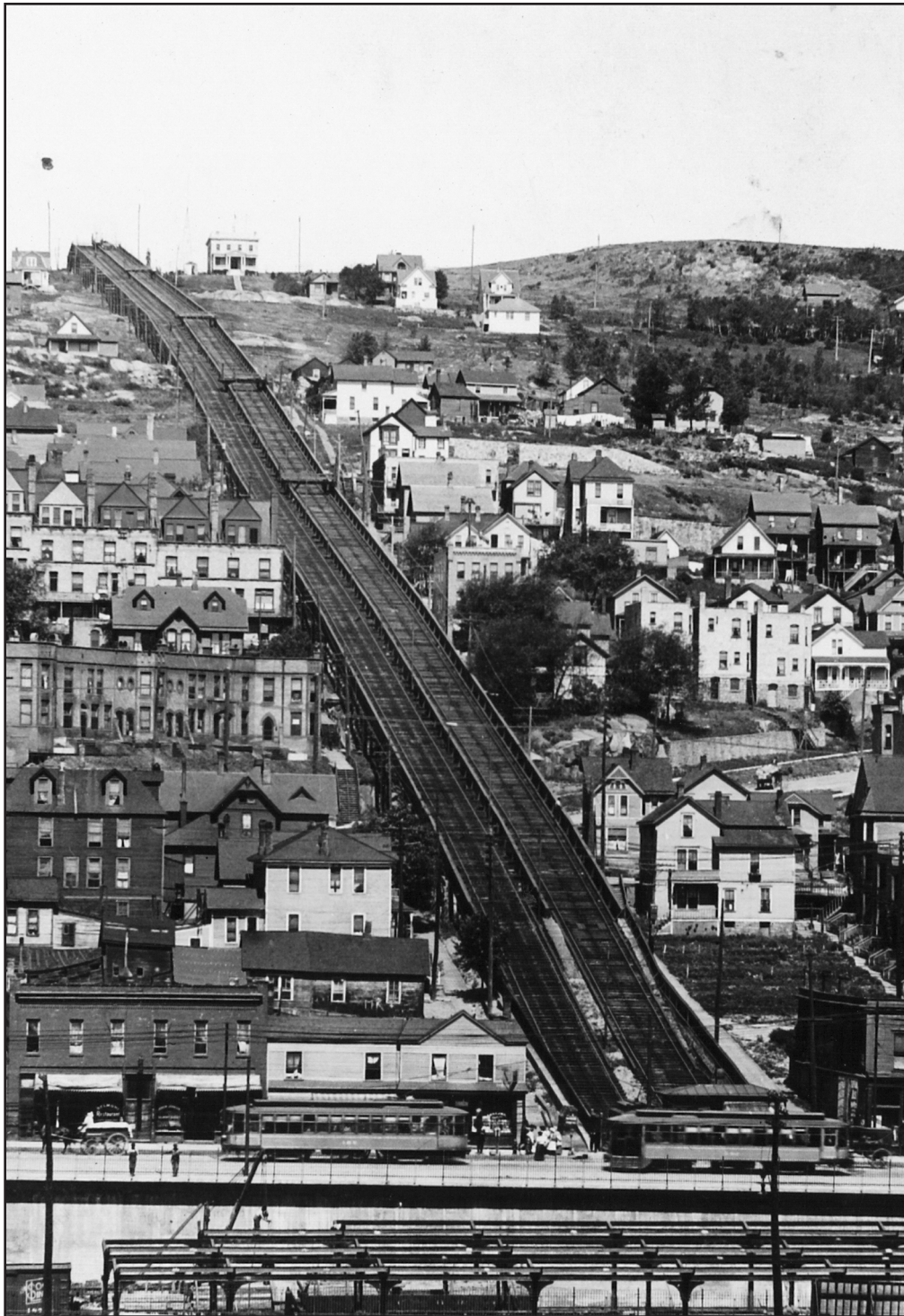
the cars at all times. He will receive his signals by telephone from the conductors at the different stations and will make stops through signals, which he will receive when the cars make an electrical contact when nearing the different depots. Depots will be located at 2nd St., 3rd St., 4th St., between 5th and 6th Sts., and at the boulevard.

Depots will be located in the center or between the two cars and as they will be of first class construction and all alike the installation as a whole should be very attractive in appearance giving rapid and frequent service with every possible appliance provided against accidents.

April 4, 1910

Smith sends Warren blueprints of cable sheaves and steel structure at top of incline and requests new measurements to confirm drawings are accurate.





April 7, 1910

Warren returns the drawings with corrected measurements to Smith.

Throughout the project, Warren took a very hands-on role, personally approving many details and suggesting changes as they came to mind. Here is the first example of this.

May 3, 1910

Warren to Smith

It just occurred to me that we should have some sort of waiting room that would accommodate twenty or thirty people at a time at the head of the incline. This room should be close enough to the engineer's cab so that he could exercise a little supervision over it without being close enough so that persons in the room would be likely to annoy the engineer, or take his attention away from the work while he is moving the cars. We might possibly want to arrange the room so that we could sell the confectionary privilege to someone who would occupy it during the tourist season.

The exact location of the stations proved both controversial and technically challenging during the entire design process. The old Incline had three intermediate stations at 4th Street, 5th Street and 7th Street, also referred to as the Boulevard. The rebuilt Incline would have five intermediate stations. It was designed so that both cars stopped at stations simultaneously. When one stopped at 2nd Street the other stopped at 7th Street (the Boulevard). 3rd Street and 5th-6th Street were paired and both cars met exactly at 4th Street. The changes in station location are described and discussed in this memo from Warren.

Left: The photo at far left is before the 1911 rebuild, the nearer photo after the rebuild. The bridge structure that carried the incline was retained, but the three old intermediate stations were replaced with five new ones.

August 25, 1910

Proposed changes in locations of stations on 7th Avenue incline.

Second Street: New station foot of steps to be 96 feet south of southerly property line of Second Street.

Third Street: To be placed at Third Street.

Fourth Street: Station to be moved from lower to upper side of street.

Fifth Street: Station to be moved about 167 feet north of present station, or about 201 feet north of the northerly line of 5th St.

Boulevard or 7th Street: Station to be moved about 46 feet south.

The only changes contemplated by the above plan that could cause any dissatisfaction are the changes in the

The rebuilding replaced the Superior Street station with a new one rotated 90 degrees and squeezed between the tracks. Both housed a waiting room and news stand. The rear of the new station was extended twice. Note the Incline Saloon in the top photo.



DULUTH STREET RAILWAY CO.

Memorandum showing passengers carried on 21 week days on Incline
Up-Bound trips from 4:17 P.M. to 6:32 P.M., in August 1910 compared with August 1909.
Figures in Red indicate more than seating capacity of 20 passengers.
" " " and circled indicate more than safe standing load of 45.

AUGUST 1909.

| Trip | | | | | | | | | | | | | | | | | | | | | Average | |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------|----|
| 4:17 | 8 | 6 | 1 | 4 | 2 | 4 | 3 | 2 | 2 | 4 | 5 | 6 | 3 | 8 | 2 | 10 | 2 | 11 | 7 | 1 | 5 | 4 |
| 4:32 | 30 | 26 | 21 | 15 | 16 | 35 | 12 | 24 | 22 | 19 | 33 | 26 | 27 | 21 | 20 | 20 | 27 | 27 | 21 | 37 | 25 | 24 |
| 4:47 | 10 | 19 | 19 | 17 | 16 | 14 | 21 | 21 | 25 | 16 | 24 | 21 | 12 | 3 | 12 | 10 | 11 | 12 | 32 | 27 | 20 | 17 |
| 5:02 | 17 | 17 | 18 | 29 | 26 | 19 | 18 | 26 | 19 | 15 | 24 | 12 | 15 | 31 | 22 | 14 | 28 | 15 | 25 | 28 | 20 | 20 |
| 5:17 | 29 | 34 | 36 | 20 | 28 | 27 | 17 | 46 | 30 | 34 | 34 | 22 | 40 | 42 | 33 | 23 | 35 | 26 | 28 | 32 | 36 | 31 |
| 5:32 | 50 | 20 | 33 | 31 | 21 | 36 | 37 | 40 | 29 | 26 | 41 | 47 | 47 | 25 | 36 | 31 | 50 | 32 | 34 | 33 | 36 | 35 |
| 5:47 | 37 | 45 | 60 | 46 | 45 | 61 | 47 | 42 | 52 | 42 | 42 | 49 | 45 | 43 | 39 | 49 | 56 | 42 | 52 | 40 | 57 | 46 |
| 6:02 | 42 | 40 | 38 | 46 | 38 | 37 | 58 | 34 | 49 | 48 | 36 | 58 | 40 | 50 | 54 | 41 | 40 | 65 | 50 | 54 | 37 | 45 |
| 6:17 | 39 | 50 | 58 | 44 | 40 | 54 | 65 | 53 | 51 | 48 | 51 | 51 | 54 | 45 | 59 | 65 | 47 | 43 | 59 | 46 | 58 | 51 |
| 6:32 | 26 | 34 | 28 | 36 | 32 | 44 | 39 | 25 | 32 | 31 | 43 | 35 | 47 | 26 | 32 | 35 | 33 | 40 | 33 | 41 | 40 | 35 |

56 trips less than seating capacity--113 over seating capacity--41 over safe standing load.

AUGUST 1910

| Trip | | | | | | | | | | | | | | | | | | | | | Average | |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------|----|
| 4:17 | 3 | 5 | 10 | 4 | 5 | 3 | 4 | 53 | 11 | 2 | 9 | 7 | 6 | 1 | 4 | 47 | 7 | 7 | 8 | 5 | 4 | 10 |
| 4:32 | 35 | 25 | 20 | 27 | 26 | 23 | 28 | 36 | 32 | 37 | 23 | 30 | 27 | 32 | 31 | 30 | 24 | 30 | 47 | 26 | 22 | 29 |
| 4:47 | 26 | 14 | 19 | 24 | 28 | 9 | 8 | 14 | 37 | 28 | 21 | | 16 | 29 | 24 | 21 | 17 | 21 | 19 | 29 | 25 | 21 |
| 5:02 | 25 | 21 | 22 | 30 | 29 | 31 | 16 | 30 | 23 | 30 | 16 | 17 | 31 | 30 | 23 | 20 | 28 | 23 | 37 | 36 | 34 | 27 |
| 5:17 | 45 | 26 | 22 | 31 | 22 | 25 | 27 | 17 | 33 | 22 | 26 | 29 | 40 | 40 | 39 | 6 | 27 | 24 | 30 | 30 | 36 | 29 |
| 5:32 | 30 | 38 | 38 | 31 | 32 | 35 | 26 | 37 | 29 | 35 | 43 | 28 | 55 | 23 | 32 | 9 | 25 | 28 | 33 | 31 | 38 | 32 |
| 5:47 | 37 | 32 | 34 | 41 | 45 | 44 | 38 | 33 | 37 | 62 | 34 | 37 | 77 | 20 | 37 | | 44 | 42 | 31 | 28 | 27 | 39 |
| 6:02 | 47 | 36 | 43 | 37 | 40 | 40 | 41 | 47 | 42 | | 39 | 27 | 70 | 45 | 50 | 38 | 36 | 43 | 49 | 40 | 47 | 43 |
| 6:17 | 40 | 51 | 50 | 67 | 37 | 63 | 65 | 40 | 55 | | 36 | 48 | 66 | 60 | 55 | 8 | 44 | 67 | 49 | 59 | 44 | 50 |
| 6:32 | 35 | 24 | 40 | 44 | 37 | 37 | 36 | 38 | 33 | 68 | 28 | 26 | 61 | 31 | 43 | 31 | 33 | 32 | 30 | 26 | 50 | 38 |

37 trips less than seating capacity--141 Over seating capacity--28 over safe standing load. 4 not counted.

Any number over 20 in this summary of PM rush hour ridership indicates a standing load, which shows why the DSR had to add a second car to the Incline.

Sept 15, 1910.

location of the 4th St. and 5th St. stations. The 4th St. station is merely changed from the lower side to the upper side of the street. This will make it harder to reach from the street, necessitating steps about twice as high as the present steps, but this station must necessarily be placed exactly where the two cars pass each other. If any change was made in the location of this station it would necessitate two stations instead of one and a separate stop would have to be made at each. The 5th St. station as now planned will be the one that will be moved the farthest and there is already more or less complaint being made in anticipation of the change.

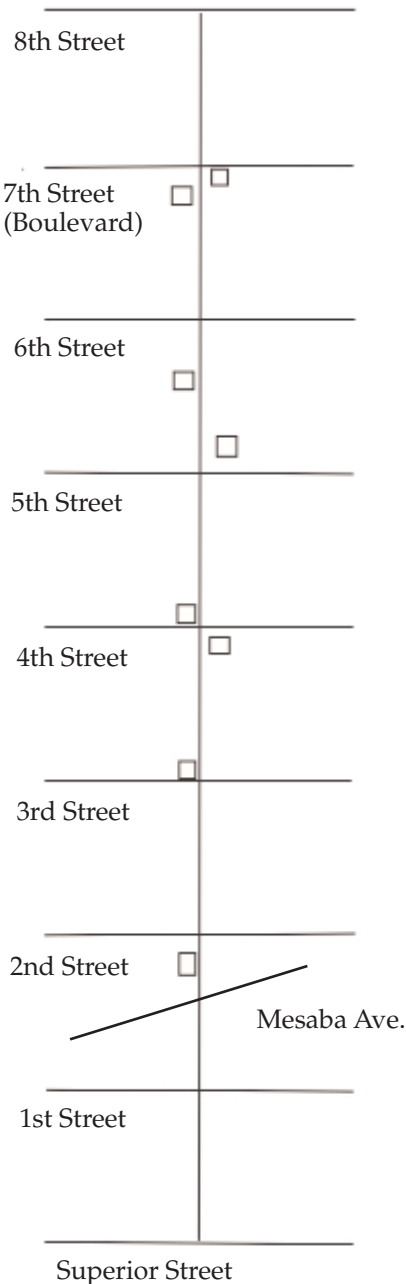
While this change will make it necessary for people now using the 5th Street station to walk up the hill about 167 feet farther it brings it nearer 6th Street where there is no station and it more equally divides the space between the 4th Street and 7th Street stations. It will, when 6th Street becomes as settled as 5th Street now is, give the best service to the greatest number in this locality. If this station should be left where it now is it would necessitate moving the 3rd Street station to almost the center of the block between 3rd and 4th Streets, bringing it only about half a block from the 4th St. station, and a block and a half from the 2nd St. station. Such a change would inconvenience a great many more people than the proposed change of 5th Street on account of the fact that the 3rd Street station is made a great deal more use of than the 5th St. station.

In September Warren was surprised to discover that the Incline project had been delayed. Apparently the deal for TCRT to build the new incline was done on a handshake with TCRT President Calvin Goodrich but no one else at TCRT knew about the commitment, hence the delay because there was no formal contract. Warren thought the work was being done when it wasn't.

On September 8 TCRT General Manager Willard Hield wrote to Warren that the Incline drawings were "substantially complete" and had been

Station Locations

1911-1939 1902-1911



forwarded to Goodrich for approval. He predicted a construction completion goal of January 2011, with erection in March. This is when Warren discovered that the work by TCRT had been delayed.

He wrote Goodrich asking that the work begin. It's important to remember that Goodrich was technically Warren's boss, because of the controlling interest in DSR by TCRT management. Goodrich responded by requesting the ridership history of the Incline and the connecting Highland streetcar line, to understand why the rebuild was needed. Warren responded with a compelling case. Every rush hour the single 20-passenger incline car was carrying heavy standing loads of 50 or more and as high as 77 in one trip.

Sept. 14, 1910

Warren sent Goodrich these passenger counts and revenue for the incline and Highland line for Aug. 31.

Incline

Up bound trips

335 Cash passengers
700 Transfers received
1035 total passengers

Down bound trips

235 Cash passengers
381 Transfers received
616 total passengers

Highland line

Up bound trips

4 Cash passengers
396 Transfers received
400 total passengers

Down bound trips

375 Cash passengers
2 Transfers received
377 total passengers

Asked to project future ridership should the Incline be rebuilt with expanded capacity, Warren responded.



Above: The west car crosses Mesaba Avenue, just below the 2nd Street station.
Below: Looking downhill from the 2nd Street station.





The Incline crosses 2nd Street. The 2nd Street station is on the downhill side of the street, hidden behind the row house at right. In the distance the streetcar tracks used by the East 4th Street, East 8th Street and Kenwood lines can be seen entering the street at 3rd Avenue W.

Sept. 15, 1910

Warren to Goodrich

I have assumed...that there should be an increase of at least 20% on the Incline due to the local traffic between Superior Street and the intermediate stations, which will be encouraged by the more frequent service, and about the same increase on the Highland line as there has been a steady increase for a number of years past.

During the first five years the lines were in operation large sums were expended in attractions at the pavilion which increased the earnings materially, but not as much as the attractions cost. After the attractions were dropped the earnings dropped about \$4000 a year and remained stationary for three years until 1900 when there was a

material increase and then the pavilion burned and the line was out of business until the beginning of 1902. Since 1904 there has been a steady, if not very large, increase.

On October 12 Walter Smith visited Duluth to inspect the incline site. He had these comments.

While I was in Duluth I checked over plans carefully and this arrangement of the station and steps at the foot of the hill did not look good to me. I believe that the public would find a great deal of fault with the steps. They would say that the Company has built an Incline and then forced us to walk halfway up the hill before getting a car.

The reason for this arrangement was that you did not want the news stand removed and then decided to extend it across the width of both tracks.

I send you blue print 99-B-1178 showing plan for a station with the news stand entirely removed. This plan seems to me to have many things in its favor. It...would show off the cars and the Incline, also tend to draw business and attract strangers far more than if it had the news stand."

Oct. 14, 1910

Warren to Smith

I like the looks of your new plan for the lower terminal of the incline very much better than the original plan. Another good

feature of this change will be the necessary lengthening of the cable, which will bring the station above 5th Street about 30 feet nearer the street. It will also bring the 4th Street station about 15 feet lower and I think that would be an improvement.

I think the narrow station between the cars at the foot should be made as deep as possible, even if it is extended back until the floor at the back end is about level with the rails. This would give us in depth what we cannot get in width, and would enable us later to put a counter across the back and some shelving in that end, which would make a little news stand about six feet wide by whatever length could be spared.

With the new arrangement the car will be in motion about two-thirds of the time, or about ten minutes out of every fifteen. During the ten minutes wait the people have been accustomed to have a heated waiting room at Superior Street, and I am afraid it will be necessary to put a heater in the Superior Street station and if there is a heater it would almost be necessary to have an attendant. We also find it convenient to have a telephone in the Superior Street waiting station with someone there to answer it, and I think very likely we will want to fit up a small news stand in the rear of this station. Please see if you can plan along this line.

If we put a heater in the Superior Street station...I suppose we would likely be asked to put heaters in all the stations, but our argument against it would be that there could not be a heater without an attendant.

While this appeared to be a commitment to heat the station and staff it with a news stand, somewhere in the process that decision was reversed. More on that later.

In the course of preparing this article, I learned more than I knew before about cable operated railways. It seems that the cable expands and contracts with temperature changes and wear. That fact was noted by Smith.

Oct. 18, 1910

Smith to Warren

The cars will be coupled up so that the



Four views of the 4th Street station, located in the precise middle of the line so both cars would stop at it simultaneously.





car at the foot of the hill will engage the air cushions at about the same time the car at the top of the hill does. Of course this will vary according to how often the slack in the cable is taken up.

The doors on the waiting stations appear to be wide enough to take care of all variation in temperature and a reasonable amount of variation due to the stretching of the cable.

The old Superior Street station included a news stand. Upon finally looking at the lease, Warren discovered that it had another year to run, so provisions had to be made to accommodate the tenant during construction and thereafter. With space tight in the new station, there was discussion over whether there should be a coal stove or electric heaters. Warren dismissed the electric heaters because their small size would permit them to be installed in the intermediate stations and he didn't want that.

Anyone who has ever designed a transit waiting facility (this writer used to do it for a living) knows that amenities are a two-edged sword. Heated enclosed facilities are great for the passengers but tend to attract vandals and the homeless and can be difficult to keep from being trashed because they are unattended, as Warren notes in the following memo to Smith.

Dec. 1, 1910

I have been thinking a good deal about the waiting stations on the incline and I am afraid we are going to have a great deal of trouble to keep them in good order. You will remember that at one time many years ago we had two closed waiting stations at 4th Street and the people in the neighborhood made so much complaint about the way they were misused that we



The 5th-6th Street station, viewed from two angles. Not sure if the top photo is overexposed, or it was just a foggy day in Duluth.

did away with them entirely and adopted the present open platform with a railing around it. This has been satisfactory and there has been very little complaint, except from one man whose family uses the incline and he thinks there should be some protection from the elements. With stations such as you have planned being entirely closed and the upper portion being composed of glass you will realize what will probably happen to them.

I have come to the conclusion that it might be proper for us to try once more to see if we cannot maintain the closed stations, except I would like you to build the window frames so that there will be something solid to which we can fasten a strong wire netting with close mesh so that it will stand away from the glass as far as possible. This will protect the windows from boys who throw at them from the outside and we will have to try by employing a special policeman occasionally and catching and punishing vandals to keep the stations from being abused in other ways.

Smith's response to Warren was more optimistic.

Dec. 2, 1910

I do not believe you will have any great trouble keeping these stations in good condition. The stations will be better built than the old ones and I think the public generally will appreciate this and give you enough moral support so that the boys and rowdies will not be able to make you much if any trouble. I will arrange to have the windows covered with a substantial netting to protect them from stones.

By mid-December Smith informed Warren that work was underway on all the Incline components, with delivery of materials anticipated by February 1911, with erection in the spring. That date would not be met.

As word spread among residents that the Incline rebuild was approaching, some began second-guessing the station locations, starting with this letter to Warren from Duluth's Postmaster, A. P. Cook.

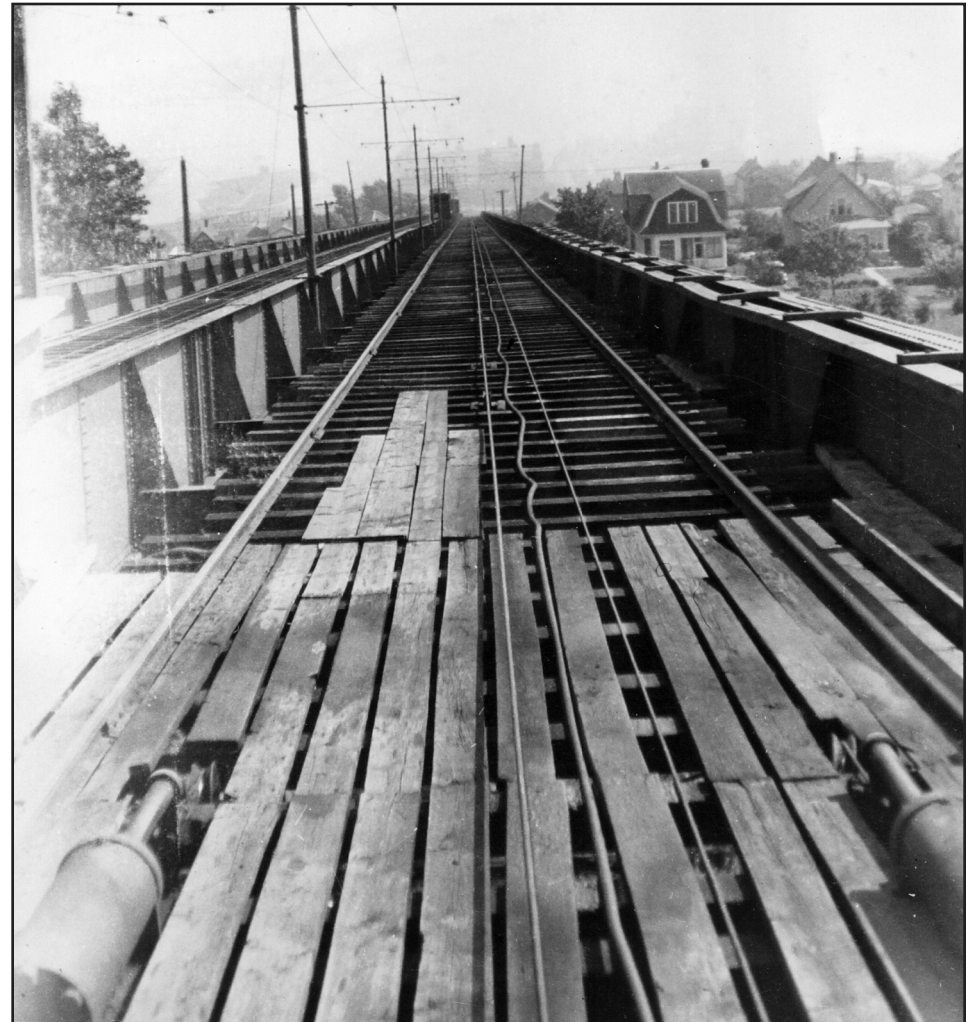


Above: 7th Street was also called Boulevard Drive (now Skyline Drive). The top view shows the pre-1911 station location. The rebuild moved it slightly down the hill, prompting A. P. Cook's protest.
Below: The view from the top, with the 7th Street station nearest the camera and surrounded by more recent development. Note the "air cushions" at the bottom of the photo.

Mar. 6, 1911

I am informed that with the improvements about to be made on the Seventh Avenue West Incline, that you contemplate moving the station, now located 100 feet below the Boulevard, still farther down the hill. As a taxpayer and patron of the Incline I enter a most vigorous protest against the location of this station. The present location has always been inconvenient and unpleasant to your patrons and it is the sentiment of everyone located on the hillside that uses that station, that you should place the same on the Boulevard.

Warren had been the General Manager since 1893. In his mind this was his transit system, he had good reasons for where the stations were located and he wasn't about to get bogged down with citizen input. His response to Cook is a masterpiece of straightforward explanation seasoned with disdain.





Mar. 10, 1911

If my memory serves me right the Boulevard station was originally put in at your earnest solicitation, and I think largely for your personal benefit. I cannot remember the circumstances leading to the location of the stairway just where it was put, but as I remember it you were entirely satisfied with it at that time and I do not remember any complaints from anyone about its location not being satisfactory until I received your letter.

It occurs to me that the location which you say is 100 feet below the Boulevard was selected on account of the ground at that point being higher than it is at the Boulevard, necessitating fewer steps, or else it was thought at the time that the location selected would more evenly divide the distance between the end of the line and the 5th Street station.

Heretofore, and until plans were made for rebuilding the incline, it would not have been a very difficult matter to have moved this Boulevard station, but with the new arrangement any change in the location of the Boulevard station will

The engineer occupied the small brick building sitting atop the brick hoist house. Originally there was a separate waiting room between the hoist house and the streetcar boarding area.



necessitate a change also in the location of the 2nd Street station.

We have endeavored to leave all the stations in their present location as nearly as possible and the plans were finally adjusted so that none of the stations except 5th Street would be moved more than a car length or two. We found we could not avoid making a slight change in the location of the 5th Street station. The 7th Street station, about which you are concerned, if moved at all will be only moved a few feet to get the correct adjustment between it and the 2nd Street station on one side or the other of the bents of the trestle work.

We had supposed that it would be very satisfactory to the users of the 7th Street station to learn that its location would not be changed, and it seems a little strange that now for the first time since the station was established some five or six years ago its location becomes difficult to alter, it should be found to be in the wrong place.

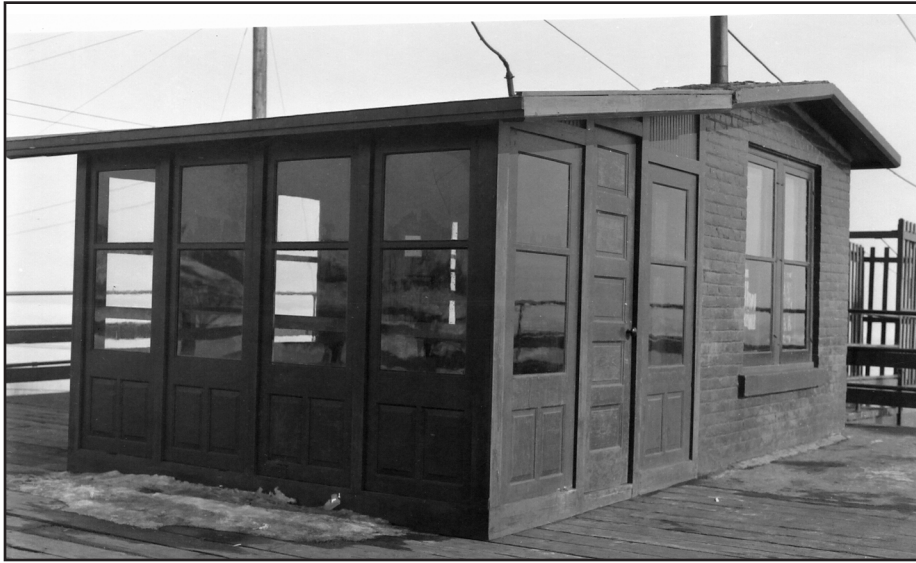
Warren was still worked up the next day and vented about station location and citizen involvement to Smith in a particularly candid letter.

Mar. 11, 1911

The location of the incline stations appears to be the serious public question now agitating the minds of the various hillside clubs. I have heard more or less about this from time to time but have not paid much attention to it until the last few days, as I thought it was better to ignore it than to encourage the discussion by taking any notice of it.

I have received a letter from A. P. Cook, who you probably remember built a freak house on the Boulevard a number of years ago. He is now our Postmaster. He demands that the station at the Boulevard be located directly upon the Boulevard.

Our Mr. Moore, who rides the incline daily, tells me that some hillside club had a meeting the other night and spent the entire evening discussing the incline stations, and yesterday a member of the Board of Public Works called me up and rather insisted upon our filing our plans showing the exact location of the stations with the Board. I tried to discourage the



Above: In later years the free-standing waiting room was replaced by a lean-to attached to the engineer's office.
Below left: Looking toward the front of an Incline car, which had standard TCRT seats. Below right: The entrance and conductor controls, including the air brake. A seat and farebox were added later.



*East Incline Car Looking South.
H.H. Brown 6-19-13. 11 AM*

Board taking any part in these discussions, and suggested to them to send anyone who had anything to say about the location of the stations to our office and, without refusing flatly to do so, gave them to understand that we had no thought of filing any plans with them.

If these matters are taken up by the City Council and Board of Public Works you will realize that it would be very unfortunate as it would take all the time and attention of our city officials and they would have no time left to attend to their other duties and in the end they would demand a station located exactly at every cross street and alley and we would, of course, have to decline to put them in that way, and then for the following year they would pass resolutions demanding the stations every Monday night and only cease when they found that no attention was paid to them. It is my idea that we should pay no attention whatever to all this clamor.

After all that he instructs Smith to move the Boulevard station higher and the 2nd Street station lower to mollify Cook. Shortly after drafting the letter, who should show up at his office but the complainer Cook with an alderman in tow. Warren writes that he met with them and all agreed the station location was OK after all. However, the issue would resurface again later.

From down in the Twin Cities, TCRT President Calvin Goodrich was concerned that closing the Incline too early in the year for construction would inconvenience and alienate the riders because of cold and stormy weather. After some discussion with Warren, both agreed to hold off construction until May when the weather improved. As a side benefit, this gave Snelling Shops some breathing room to finish their work. Goodrich also insisted that a horse-drawn bus operate during construction so at least some of the public wouldn't have to walk up and



*East Incline Car Interior Looking South.
By H.H.B. June 10/13 at 11 AM.*

down the hill. To minimize the closure, it was agreed that construction would wait until all materials were delivered to Duluth.

Mar. 8, 1911
DSR Master Mechanic Crawford to DSR Superintendent Moore

They agreed it would be a good idea to select conductors and engineers for the new incline and have them participate in the erection to become acquainted with its workings.

Mar. 10, 1911
Smith to Warren
TCRT is sending a foreman, a time keeper and a third man to Duluth to oversee the erecting work. He asks Warren to find a boarding house for them, preferably halfway up the hill next to the incline. He estimates it will take 6 weeks to 2 months to complete the work, ending June 1.

Mar. 14, 1911
Smith to Warren
Stations, stairways and railings are completed and ready to be shipped. He advises against moving 7th Street station, saying if 2nd Street station "is moved down any further it might as well be abandoned."

Mar. 16, 1911
Warren to Goodrich
He anticipates shutting down the incline about May 15, with completion by June 1.

Mar. 17, 1911
Warren to DSR Secretary Reichert,
He describes problems with the building code that have arisen now that they've applied for a permit. The Superior Street station doesn't conform to the building code. Warren proposes talking to the alderman to rule that the code doesn't apply to a station.

Mar. 17, 1911
Warren to Smith
Warren makes a final decision to

leave the station locations unchanged from the latest design.

Mar. 23, 1911
Warren to Smith
The City won't require fire code changes to Superior Street station.

Mar. 22, 1911
Smith to Warren
Referring to the Incline engineers who will run the line: It would be well to have each man work 10 hours and it would certainly be a good plan to have the night engineer sleep in the engineer's house and he would always be there to make the first trip in the morning.

For conductors I think you should have a fairly good-sized, strong looking man so that he could handle the people when there was a big standing load, but above all he must be a man who would do his work slowly and one that will not take any chances.

As you know we have put air brakes on each car and the air valve handle is close to the door. I think possibly it would be a good plan to instruct the conductors to apply the air brakes every time they make a stop and that the air is not to be released until all gates and doors are closed and the conductor is ready to go to the telephone. It seems to me that this rule strictly enforced would prevent the possibility of anyone getting caught between the car and the stations.

Mar. 28, 1911
DSR Master Mechanic Crawford suggests to Warren that it would be a good idea to replace several hundred bad ties while the incline is closed for construction.

Mar. 29, 1911
DSR Superintendent Moore to Warren
Proposes changes to the engineer's house.

1. A ladder or stairway through the floor for fast access to the winding machinery downstairs.
2. An outside telephone line.
3. A building heater. The plan was

that heat from the resistors would be enough but Moore disputes that.

Apr. 11, 1911
DSR Secretary Reichert to Theodore Kamphaus

DSR may have to pay Kamphaus to install a retaining wall and sidewalk on his property located next to the Incline, in order to reach the 4th Street station.

Apr. 21, 1911
Note from Warren
Negotiations with Kamphaus have been unsuccessful, so DSR will avoid his property.

Apr. 21, 1911
Moore to Warren
Decides not to build a ladder or stair between the floors of the engineer's house, but will install a heater later if needed.

May 5, 1911
DSR Master Mechanic Crawford to Warren

The City Council has given permission to move the old Superior Street waiting room a block west to the 8th Avenue streetcar loop so the news stand renter can remain in business during construction. It was moved on May 14.

On May 8 DSR hired Board of Trade Livery to run substitute horse-drawn bus service during the shutdown, starting May 15. The bus route ran from the west end of the West 4th Street line to a connection with the Highland car, apparently via 4th Street and 8th Avenue W. A DSR conductor would ride the bus on each trip to collect and report fares and supervise the driver. 30 minutes were allocated per round trip. On May 11 arrangements were made to deliver Duluth Herald newspapers on the bus.

On May 9 DSR placed an order with the Duluth Telephone Co. to install a phone connected to the DSR switchboard inside the hoist house engineer's office.

May 17, 1911
It is discovered that telephone poles are fouling the east track, where they had only been required to clear the low-slung counterweight since 1902. Duluth Telephone Co. was contacted and removed them the next day.

May 22, 1911
The old Superior Street waiting station was put up for sale. There were no interested buyers, so DSR got a city permit to move it to the carhouse at 27th Ave. W.

Smith advised Warren on May 24 that more ties needed to be replaced than previously thought. However, he

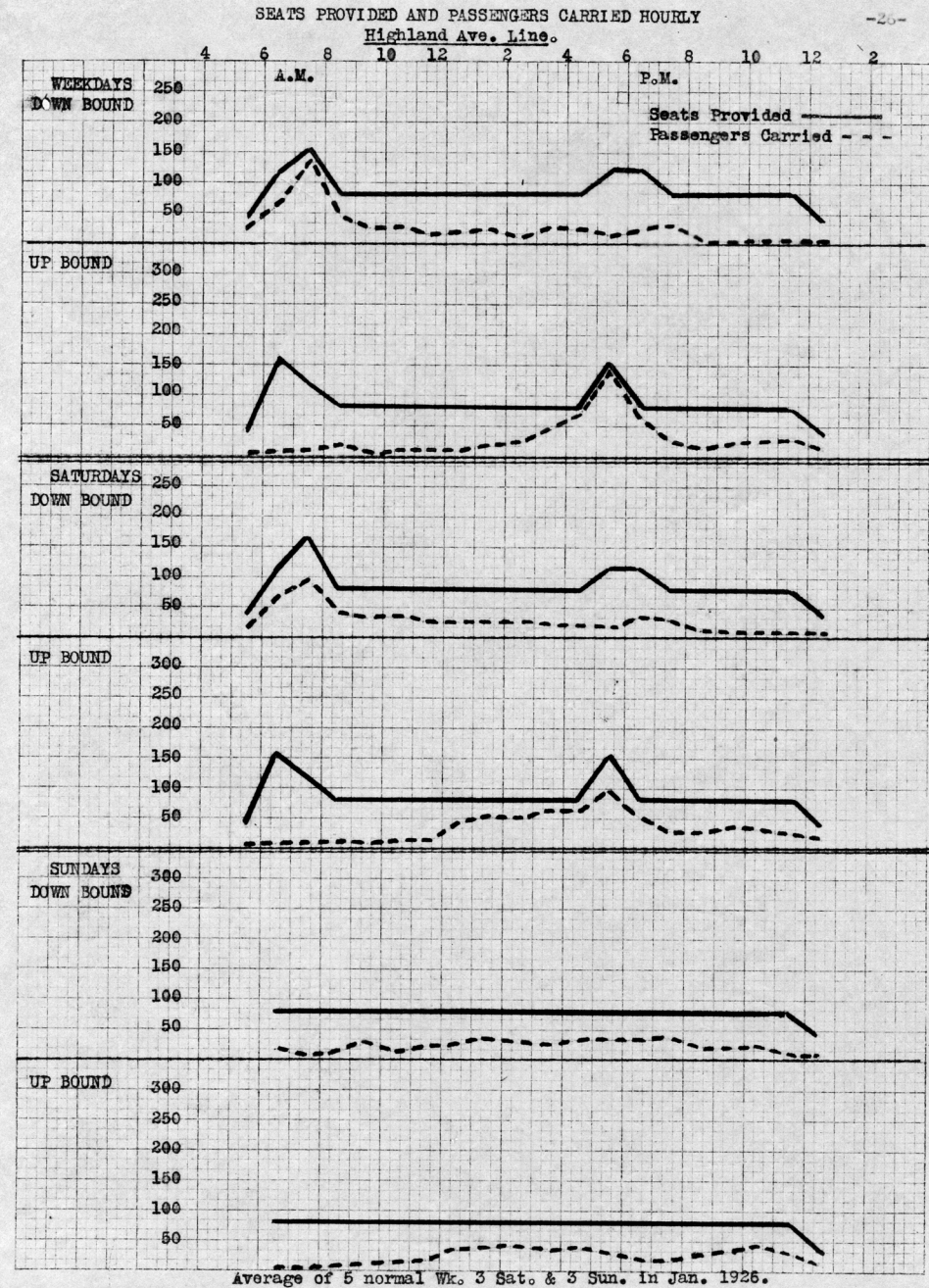
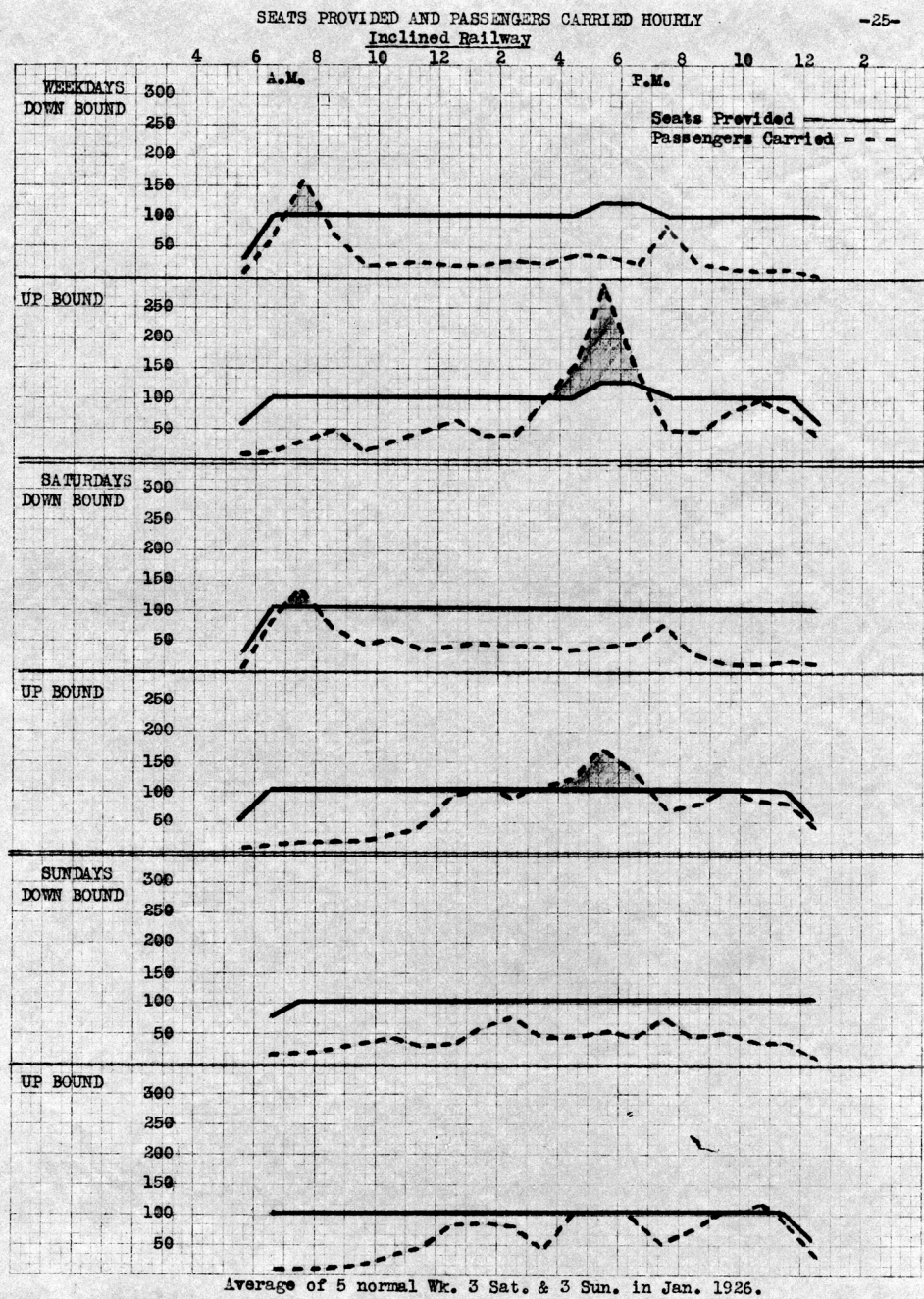
May 11, 1911.

NOTICE

Beginning Monday, May 15th, the Seventh Avenue Inclined Railway will be shut down for alterations. We expect to get the new cars in operation on or about June 1st.

While the line is shut down a 'bus will be run between the upper end of the West Fourth Street line and the hill top from 6:00 to 8:00 A.M., and from 12:00 M. to 3:00 P.M., and from 4:00 to 8:00 P.M. to accommodate our patrons.

THE DULUTH STREET RAILWAY COMPANY.



These tables show Incline and Highland line ridership by hour compared to seating capacity for every day of the week.

advised that tie replacement would be faster and easier if they waited for the new cars to be running, because they could be used to haul the ties up and down the hill. He also suggested that new ties be treated with preservative to lengthen life. Warren agreed.

Ever sweating the details, Warren asked Smith on June 2 whether the end windows of the incline cars should be made to open for more ventilation. Smith advised that they already did open.

June 5, 1911

Since learning that the new cable hoist would wrap the cable around a smaller drum than the old hoist, Warren became concerned that this would increase cable fatigue, shorten cable life and possibly even cause a catastrophic failure. He wired John A. Roebling's Sons, the cable supplier. As an aside, Roebling had achieved fame as the architect of the cable-supported Brooklyn Bridge and his company dominated wire rope production.

By happy coincidence two Roebling employees happened to be in Duluth on other business and appeared the next day to inspect the new line, which was due to reopen in five days.

Meanwhile, the horse drawn bus, which DSR has originally thought would be unnecessary, was carrying so many passengers that the livery company had to add a third team of horses to haul it up the hill.

June 10 came and the rebuilt Incline reopened on schedule. Two days later came Roebling's report, which was intended to dispel Warren's concerns. However, it was tentative on whether a thicker cable would make a difference. Warren wouldn't let it go. Finally on August 7 Roebling acknowledged that a 1 and 1/8 inch rope or a steel 1 inch rope would be safer than the 1 inch cast iron cable already in place, although it would be somewhat more expensive. No change in drum size would be needed. Having been proven right, Warren was satisfied.

June 19, 1911

Although not documented, apparently the decision to have heat and an attendant in the Superior Street station had been abandoned, because now Warren raised the need for it. Only six feet wide and wedged lengthwise between the tracks, the new station was hardly conducive to retail sales. The news stand operator was consulted and requested the back of the station be extended 6 feet into the hillside and the Superior Street doors receive larger windows to improve visibility. He also requested an additional electrical circuit. Warren approved the plans, which included installing a streetcar-type heater and coal bin under the waiting room.

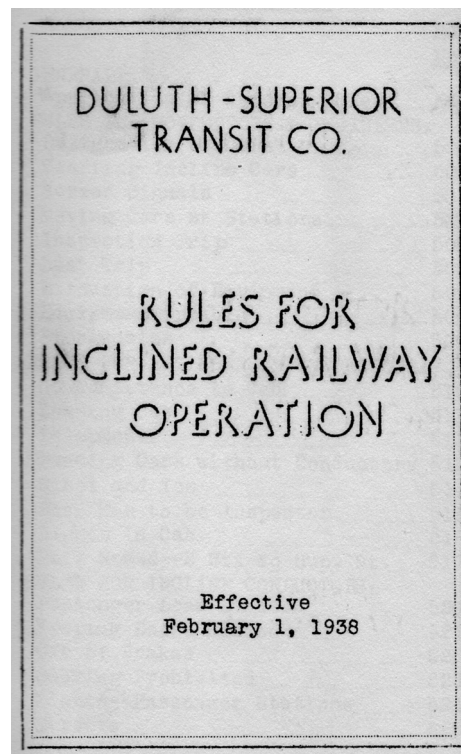
These changes required a city permit and a visit to the building inspector, who had previously asked that a rain gutter be added to the station canopy. DSR Master Mechanic Crawford recounted the conversation in a memo to DSR Secretary Reichert. It lived up to every stereotype of an imperious municipal official.

Aug. 3, 1911

I called on Mr. S. M. Keilly, building inspector, today at the City Hall to take out a permit to extend the present waiting station at the foot of the Incline six feet up the hill and to put a brick foundation under it.

He looked at the blue print and said, "Have they done anything with that canopy at the foot yet?" I answered "No sir". "Are they going to?" I said "I don't know". "Do you know that the Duluth Street Railway haven't any more rights than any other citizen?" I answered "Yes sir I do." He said "They agreed to cut it down". I told him I didn't know anything about that. He said "I guess the fellow who was up here just went ahead and put it up without saying anything to the company about it". I answered "Yes sir I think he must have."

"What is the matter with the waiting station, is it too small?" I answered "Yes sir". "Well, I guess you can build it" and he gave me the permit.



The only other retrofits were the installation of gutters over the car doors to keep everyone dry when entering or leaving the cars, protective brass interior window rods to prevent accidental glass breakage by standing passengers and storage boxes for stowing miscellaneous conductor's items. By then the Incline was working reliably and had settled into a routine that would last until 1939.

On Aug. 31 Warren wrote to Goodrich summarizing the project.

During the latter part of June and through July and August there has been an (earnings) increase of about 17% over 1910." Traffic to intermediate stations has increased, but not transfers to the Highland line.

Footnote: In 1923 a 12-foot addition was added to the Superior Street Station

Rules for Incline Railway Operations

We're lucky to have a rulebook for the Incline, dating from 1938. Here are excerpts that describe the basic operation of the cars.

STARTING INCLINE CARS

As soon as either conductor is ready to start from either terminal or from any intermediate station he will go to the telephone and say "HELLO". As soon as he hears the other conductor's "HELLO" he will say "EAST CAR CLEAR" (or "WEST CAR CLEAR" as the case may be), and the other conductor will reply "WEST CAR CLEAR" (or "EAST CAR CLEAR" as the case may be). The engineer upon hearing all signals distinctly given as above will reply "ALL CLEAR" and will start the cars. Both conductors will remain at the telephone until they hear the engineer reply "ALL CLEAR".

If patrons appear after starting, cars will not be stopped and backed up to pick up such patrons.

MOVING CARS AT STATIONS

When, after cars have been stopped at any intermediate station, it is necessary to move them for the purpose of bringing doors opposite the doors of stations, the conductor having passengers to let on or off will go to the telephone and say "HELLO" and upon getting an answering "HELLO" from the other conductor will say "EAST (or WEST) CAR AHEAD ___ FEET" or EAST (or WEST) CAR BACK ___ FEET", confirming the number of feet car is to be moved. The engineer upon hearing all such signals distinctly will acknowledge them by saying "AHEAD" or "BACK ___ FEET", and will then move the cars. The conductors will remain on the telephone and as car doors come opposite station doors will call "STOP".

HALF SPEED—2nd Street to Superior Street

From the time either car down-

bound leaves the 2nd Street Station, the engineer will not advance the controller beyond the 5th point.

USE OF BRAKES (by conductors)

Set the air brake at every stop before opening car door and release it as soon as door is closed and bolted and before telephoning signals.

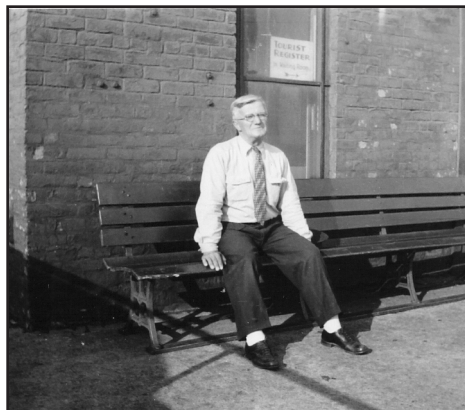
Do NOT use air brakes to stop cars at intermediate stations but apply them AFTER car has stopped to hold car while door is open.

Use air brakes when car is landing at Superior Street when necessary to prevent it from striking air buffers too hard.

The Last Day

The end for the Incline and the Highland line came on labor Day, September 4, 1939. The rest of the Duluth streetcar system had quit two months earlier, but replacing the Incline and its connection at the top was a problem. On the one hand they had operated at a loss for their entire history. On the other hand, replacing them with buses proved to be even more expensive, because two new bus routes to downtown were required, one to serve the hillside and one to replace the Highland line to Duluth Heights.

These photos capture the last day.



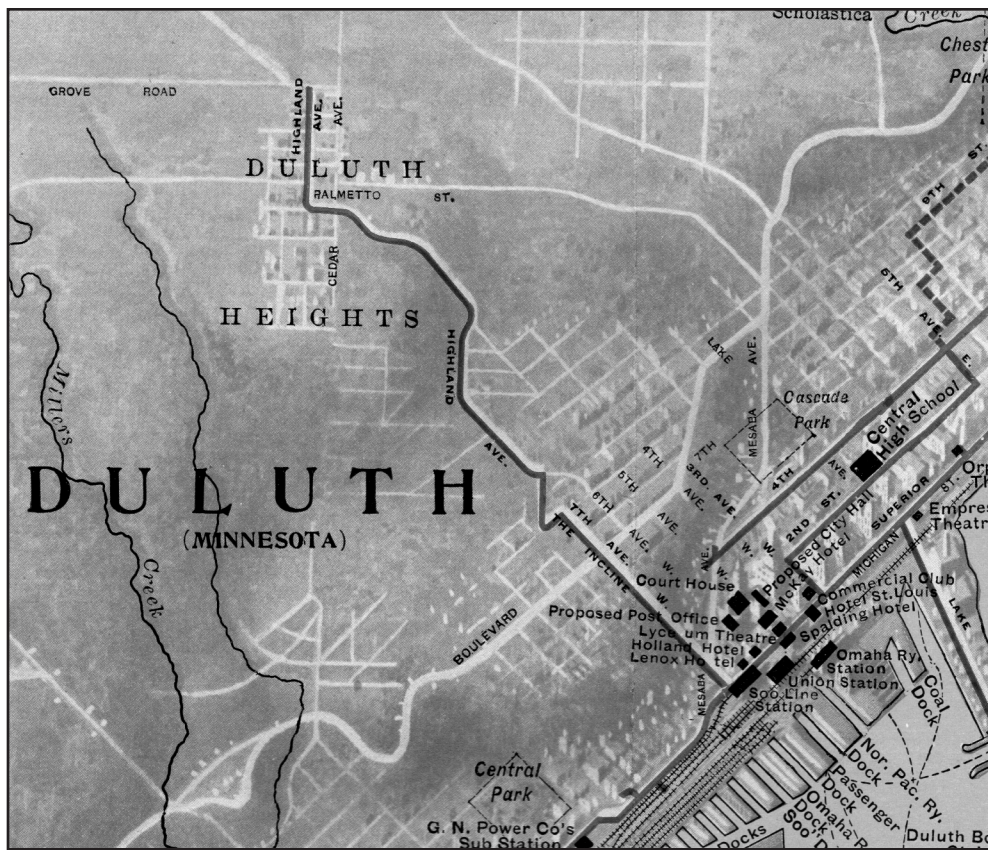
On the last day the Incline ran, someone with an inexpensive camera took one last ride and made these snapshots.

Top left: An Incline conductors and Highland motorman Gallagher at right. Middle left: A conductor shakes hands with the Incline engineer.

Bottom left: The Incline conductor relaxes on the bench outside the waiting room before the trip back down.

Top right: Before the shutdown, DSR placed signs on the Superior Street station urging locals to take one last ride.

Bottom right: Sightseeing at the top of the Incline.



Above: The only known early photo of the Highland line, taken in the late 1890s. It shows a single-truck car behind the pavilion. Northeast Minnesota Historical Center collection. Below: The line ended on a trestle at the Incline station, next to a simple carhouse.



The Highland Line

The Incline and the connecting Highland line were born out of real estate speculation. Thomas Lowry, James J. Hill and their associates saw an opportunity in Duluth Heights, barely two miles from downtown, but isolated atop the high ridge. Connecting it to the city with a streetcar line feeding an incline would open up the area to development, or so they thought.

The Highland Improvement Company secured the right of way for the Incline, which DSR built. It opened in December 1891. DSR and HIC divided the construction of the 1.8 mile streetcar line, each building about half of it. HIC contracted with DSR to run the line, with HIC pocketing the fares and reimbursing DSR for its operating cost. Service began in September 1892.

That arrangement proved more than

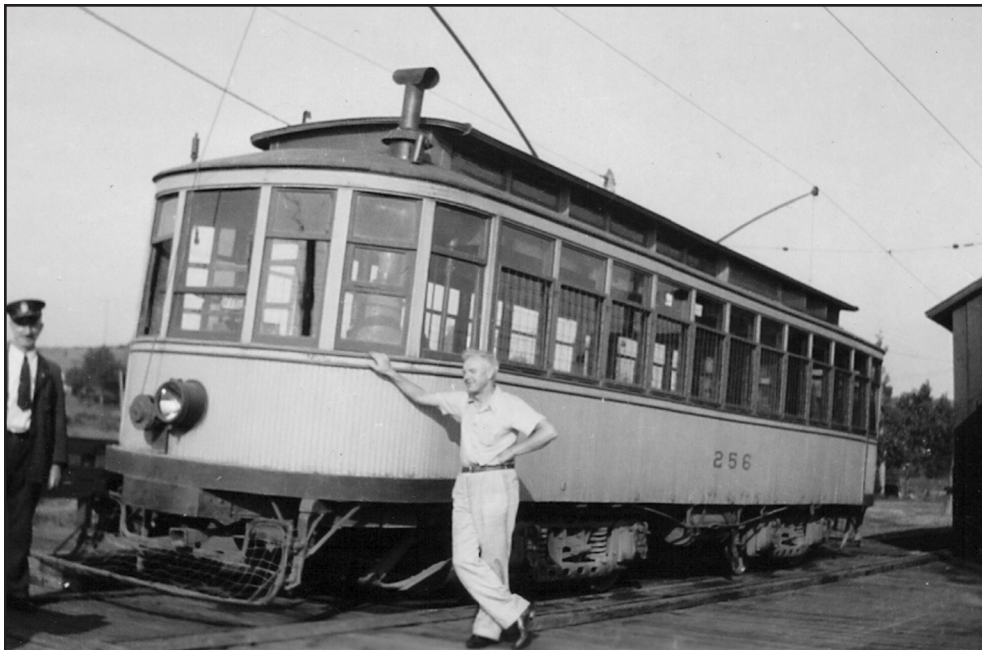
HIC could afford, so the following spring the line was deeded to DSR. The economic crisis of 1893 undoubtedly slowed home sales, because the line ran summers only through 1894.

When development finally arrived, it was anemic and confined to the last half mile of the line. Even today, the land is vacant along Orange Avenue (the former Highland Avenue) from the top of the Incline until it enters the Duluth Heights street grid.

The Highland line settled into a quiet existence, with a half-hourly car meeting the half-hourly Incline. After the rebuilding of the Incline in 1911, ridership increased to the point that two new (actually old and rebuilt) double truck cars replaced the single trucker and rush hour frequency increased to every 15 minutes (see the ridership chart on page 17). This remained the pattern until the end of service.



Above: Probably taken in the PM rush hour, the northbound car is stopped at the line's only passing siding waiting to meet the southbound car. Below: On the last day of service, Highland motorman Gallagher poses with Incline engineer Hughes. Note that the cars had doors on only one side.



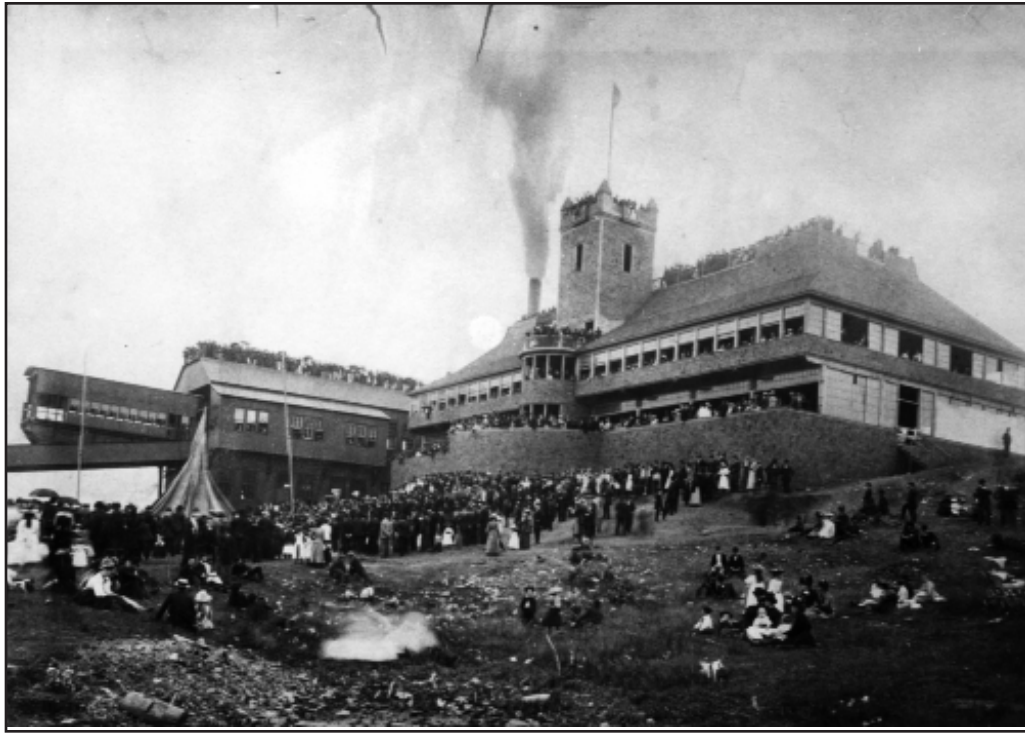
Scenes along the Highland line. Above: Looking east on Highland Avenue (now Orange Avenue) at Arlington Street. Middle: Looking west on Highland from Arlington. Bottom: Looking north on Highland (now Basswood Avenue) from Palm Street, a block south of Highway 53 in the commercial center of Duluth Heights.



Incline 1.0

As originally built, the Incline differed in several ways from the 1902 and 1911 versions. There were no intermediate stations. The hoist was powered by a stationary steam engine, not electric motors. And the cars were huge, resembling garages on rails and

soon engulfed the powerhouse, station and the pavilion. Within an hour all the buildings were a total loss. The car on the west track, which had been at the top, was cut loose when the heat of the fire melted the cable. In flames, it plummeted down the track, demolishing the Superior Street station when it hit. Fortunately, no one was on



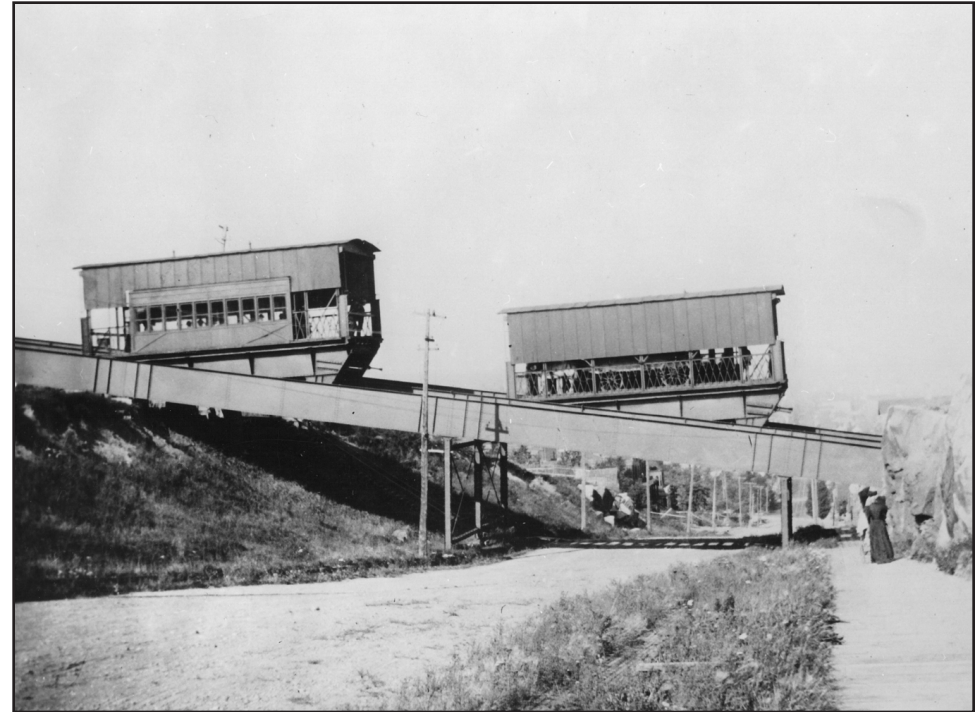
able to transport wagons along with their teams or up to 250 standing passengers. The biggest difference may have been the Beacon Hill pavilion at the top, a destination attraction opened on the 4th of July, 1892. It was a classic entertainment venue of the Victorian era, featuring a restaurant, concerts, dancing, vaudeville and all manner of special events such as balloon ascensions culminating in parachute drops.

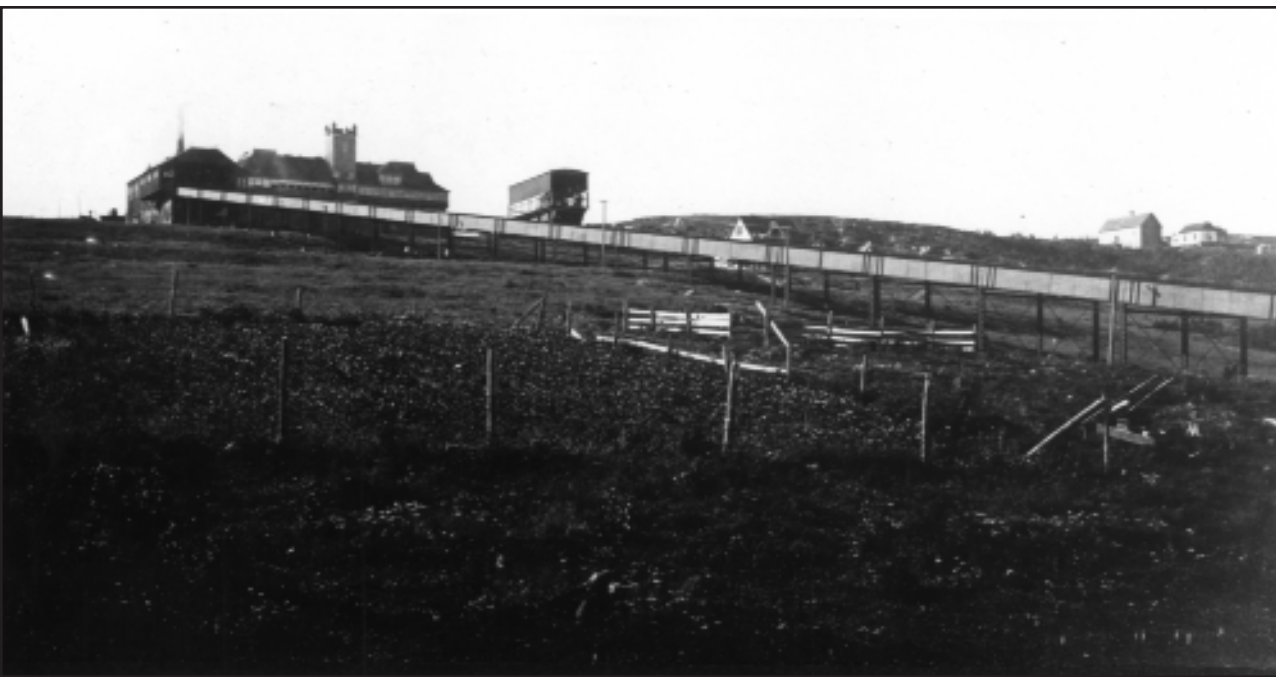
The pavilion met a fiery end on March 28, 1901. It started in the engine room of the incline's powerhouse and

board and there were no injuries.

The pavilion site was cleared and the Incline was rebuilt with a single small car, hoisted by electric motors and serving three intermediate stations. The pavilion site was cleared. Service resume on January 1, 1902.

The first incline featured huge cars that could carry up to two wagons with horses, or up to 250 stating passengers. The powerhouse and station and pavilion were separate buildings, abutting one another.





The powerhouse and pavilion were wood structures and burned quickly. Fearing a runaway, police had cleared the Superior Street station area, a wise move as it turned out. Northeast Minnesota Historical Center story.





Could there be a more Duluth scene than this? A pair of locally built whaleback lake steamers are tied up amidst the floating harbor ice as the Incline, in its 1889-1901 original incarnation scales the hillside to the pavilion. Northeast Minnesota Historical Center collection.



MINNESOTA STREETCAR MUSEUM

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